

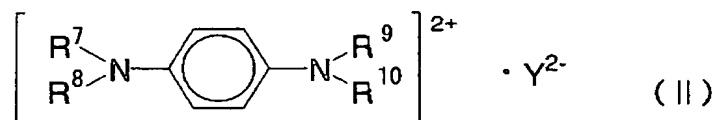
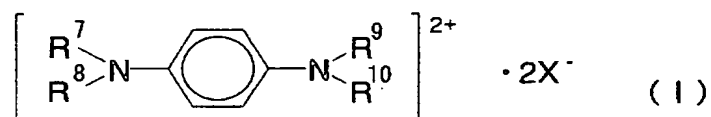
WHAT IS CLAIMED IS:

1. A near-infrared absorption film having a base film and a near-infrared absorption layer formed on the base film, wherein

5 the near-infrared absorption layer contains a diimmonium compound which has an endothermic peak of 220°C or more, determined from differential scanning calorimetry (DSC measurement) with temperature rising rate of 10°C/minute.

10 2. A near-infrared absorption film as claimed in claim 1, wherein the diimmonium compound has an endothermic peak from 225°C to 240°C, determined from the differential scanning calorimetry (DSC measurement) with temperature rising rate of 10°C/minute.

15 3. A near-infrared absorption film as claimed in claim 1 or 2, wherein the diimmonium compound is at least one of compounds represented by the following formula (I) or (II):



where each of  $R^7$  through  $R^{10}$  is at least one selected from a group consisting of an alkyl group, an aryl group, a group having aromatic ring, a hydrogen atom, and a halogen atom,  $X^-$  is a monovalent anion, and  $Y^{2-}$  is a divalent anion.

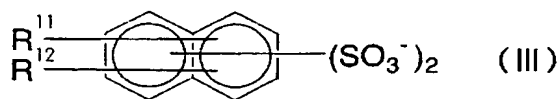
20 4. A near-infrared absorption film as claimed in claim 3, wherein the monovalent anion represented by  $X^-$  may be a

halogen ion such as  $I^-$ ,  $Cl^-$ ,  $Br^-$ , or  $F^-$ ; an inorganic acid ion such as  $NO_3^-$ ,  $BF_4^-$ ,  $PF_6^-$ ,  $ClO_4^-$ , or  $SbF_6^-$ ; an organic carboxylic acid ion such as  $CH_3COO^-$ ,  $CF_3COO^-$ , or benzoic acid ion; an organic sulfonic acid ion such as  $CH_3SO_3^-$ ,  $CF_3SO_3^-$ ,  
5 benzenesulfonic acid ion, or naphthalenesulfonic acid ion.

5. A near-infrared absorption film as claimed in claim 3, wherein the divalent anion represented by  $Y^{2-}$  is preferably an aromatic disulfonic acid ion having two sulfonic acid groups and specific examples of the divalent anion are an ion  
10 of naphthalenedisulfonic acid derivatives such as naphthalene-1,5-disulfonic acid, R acid, G acid, H acid, benzoyl H acid (a benzoyl group being attached to an amino group of H acid), p-chlorobenzoyl H acid, p-toluenesulfonyl H acid, chloro H acid (an amino group of H acid being replaced  
15 with a chlorine atom), chloroacetyl H acid, metanyl  $\gamma$  acid, 6-sulfonaphthyl- $\gamma$  acid, C acid,  $\epsilon$  acid, p-toluenesulfonyl R acid, naphthalene-1,6-disulfonic acid or 1-naphthol-4,8-disulfonic acid; carbonyl J acid, 4,4-diaminostilbene-2,2'-disulfonic acid, di-J acid,  
20 naphthalic acid, naphthalene-2,3-dicarboxylic acid, diphenic acid, stilbene-4,4'-dicarboxylic acid, 6-sulfo-2-oxy-3-naphthoic acid, anthraquinone-1,8-disulfonic acid, 1,6-diaminoanthraquinone-2,7-disulfonic acid,  
25 2-(4-sulfophenyl)-6-aminobenzotriazole-5-sulfonic acid, 6-(3-methyl-5-pyrazolonyl)-naphthalene-1,3-disulfonic acid, 1-naphthol-6-(4-amino-3-sulfo)anilino-3-sulfonic acid.

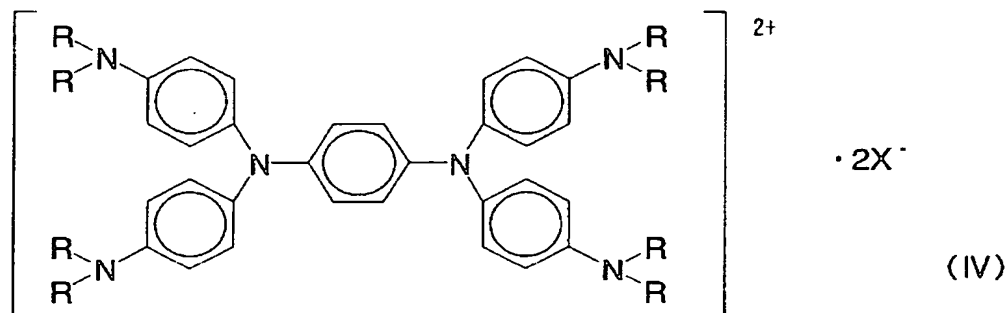
6. A near-infrared absorption film as claimed in claim 5, wherein the divalent anion represented by  $Y^{2-}$  is an  
30 naphthalenedisulfonic acid ion.

7. A near-infrared absorption film as claimed in claim 6, wherein the naphthalenedisulfonic acid ion is represented by the following formula (III):



5 where each of  $R^{11}$  and  $R^{12}$  is at least one selected from a group consisting of a lower alkyl group, a hydroxyl group, an alkylamino group, an amino group,  $-\text{NHCOR}^{13}$ ,  $-\text{NHSO}_2 R^{13}$ ,  $-\text{OSO}_2 R^{13}$  (where  $R^{13}$  is at least one selected from a group consisting of aryl groups and alkyl groups,  $R^{13}$  may have  
10 substituent(s)), an acetyl group, a hydrogen atom, and a halogen atom.

8. A near-infrared absorption film as claimed in claim 1 or 2, wherein the diimmonium compound is represented by the following formula (IV):



15 where R is an alkyl group having 1 to 8 carbon atoms, preferably a n-butyl group, and  $\text{X}^-$  as the monovalent anion is preferably  $\text{BF}_4^-$ ,  $\text{PF}_6^-$ ,  $\text{ClO}_4^-$ , or  $\text{SbF}_6^-$ .

9. A near-infrared absorption film as claimed in claim

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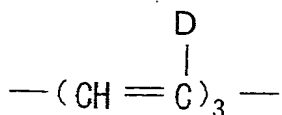
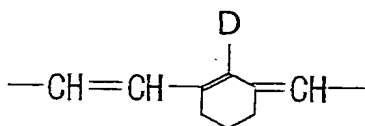


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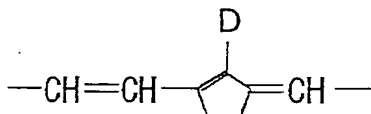
(VI)

where A is a divalent conjugating group containing an ethylene group, each of R<sup>1</sup> and R<sup>2</sup> is a monovalent group having carbon atom(s), and Z<sup>-</sup> is a monovalent anion.

- 5            13. A near-infrared absorption film as claimed in claim 12, wherein A is:



or



where D is one of an alkyl group, diphenyl amino group, a halogen atom, and hydrogen atom.

- 25            14. A near-infrared absorption film as claimed in claim 12 or 13, wherein each of R<sup>1</sup> and R<sup>2</sup> is an alkyl group, an aryl group, an alkoxy group, an alkoxy carbonyl group, a sulfonyl alkyl group, or a cyano group.

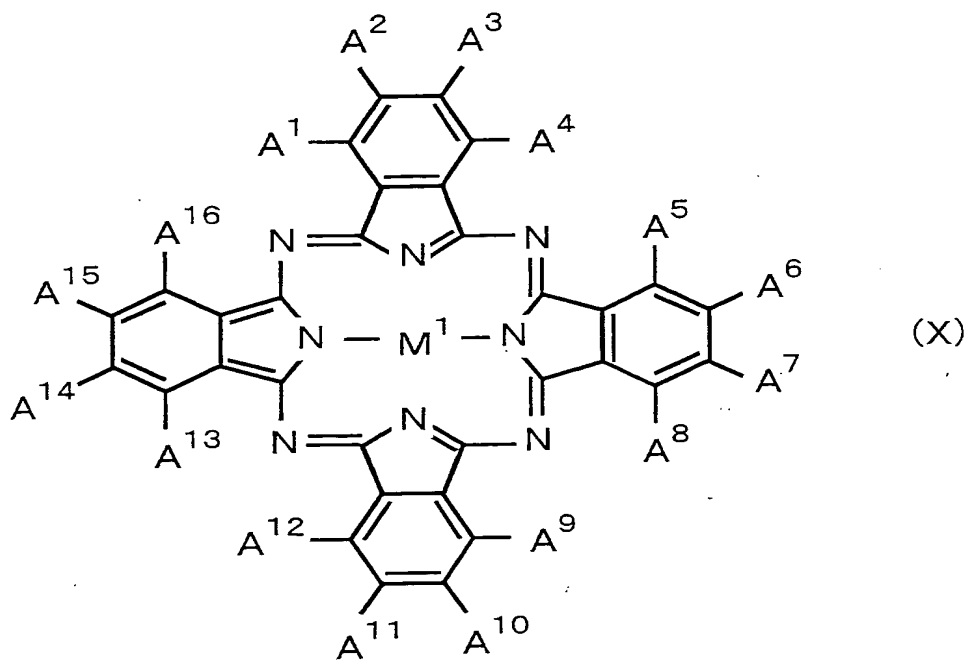
15. A near-infrared absorption film as claimed in claim 12 or 13, wherein Z<sup>-</sup> is I<sup>-</sup>, Br<sup>-</sup>, ClO<sub>4</sub><sup>-</sup>, or BF<sub>4</sub><sup>-</sup>, PF<sub>6</sub><sup>-</sup>, SbF<sub>6</sub><sup>-</sup>, CH<sub>3</sub>SO<sub>4</sub><sup>-</sup>, NO<sub>3</sub><sup>-</sup>, or CH<sub>3</sub>-C<sub>6</sub>H<sub>4</sub>-SO<sub>3</sub><sup>-</sup>.

- 30            16. A near-infrared absorption film as claimed in any

one of claims 12 through 15, wherein the near-infrared absorption layer contains 50 parts by weight or less of the cyanine compound relative to 100 parts by weight of said diimmonium compound.

5 17. A near-infrared absorption film as claimed in any one of claims 12 through 15, wherein the near-infrared absorption layer contains from 0.1 to 50 parts by weight of the cyanine compound relative to 100 parts by weight of said diimmonium compound.

10 18. A near-infrared absorption film as claimed in claim 11, wherein the phthalocyanine compound is represented by the following formula (X):

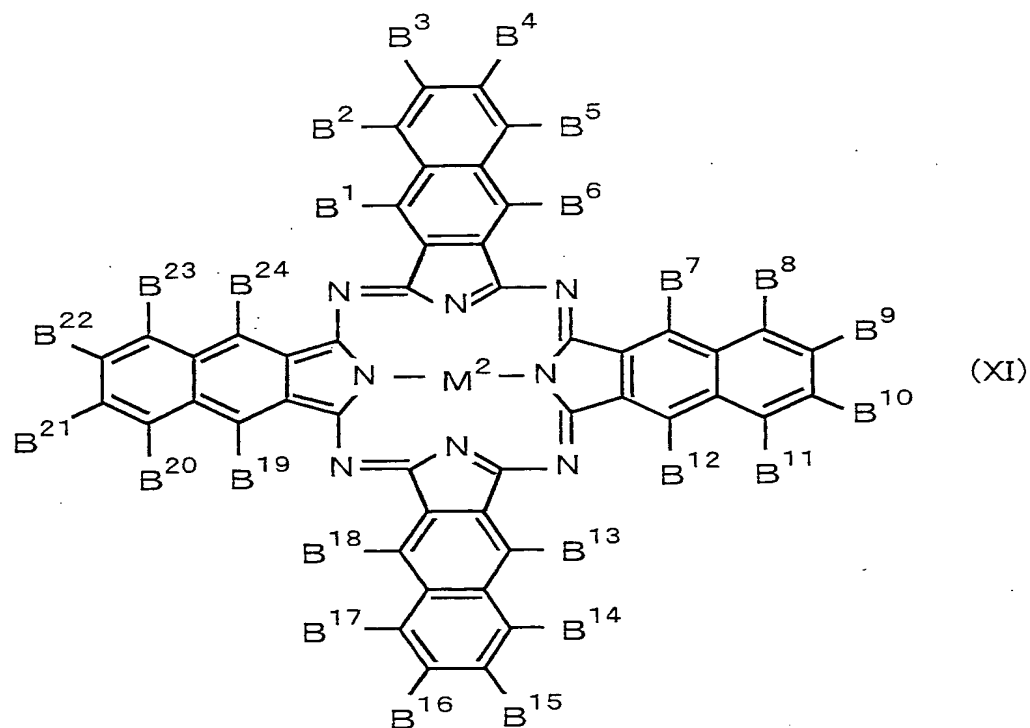


where A¹ through A¹⁶ each represent independently either one of the followings, i.e. a hydrogen atom, a halogen atom, a hydroxyl group, an amino group, a hydroxysulfonyl group, an aminosulfonyl group, or a substituent having from

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1 to 20 carbon atoms, the substituent having from 1 to 20 carbon atoms may contain either one of the followings, i.e. a nitrogen atom, a sulfur atom, an oxygen atom, and a halogen atom, and adjacent two substituents may be bonded to each other via a conjugating group, wherein each of at least four of A<sup>1</sup> through A<sup>16</sup> is at least either one of a substituent via sulfur atom and a substituent via nitrogen atom, and M<sup>1</sup> is either one of the followings, i.e. two hydrogen atoms, a divalent metallic atom, a trivalent or quadrivalent substituted metallic atom, and an oxy metal.

19. A near-infrared absorption film as claimed in claim 11, wherein the naphthalocyanine compound is represented by the following formula (XI):

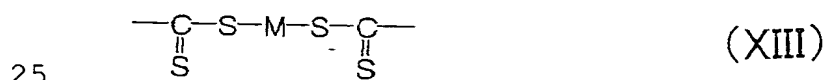


where B<sup>1</sup> through B<sup>24</sup> each represent independently

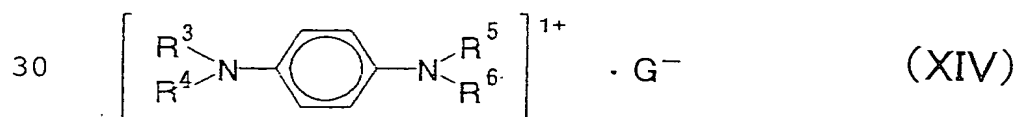
either one of the followings, i.e. a hydrogen atom, a halogen atom, a hydroxyl group, an amino group, a hydroxysulfonyl group, an aminosulfonyl group, or a substituent having from 1 to 20 carbon atoms, the substituent having from 1 to 20 carbon atoms may contain a nitrogen atom, a sulfur atom, an oxygen atom, and a halogen atom, adjacent two substituents may be bonded to each other via a conjugating group, wherein each of at least four of B<sup>1</sup> through B<sup>24</sup> is at least either one of a substituent via oxygen atom, a substituent via sulfur atom, a substituent via nitrogen atom, and M<sup>2</sup> is either one of the followings, i.e. two hydrogen atoms, a divalent metallic atom, a trivalent or quadrivalent substituted metallic atom, and an oxy metal.

20. A near-infrared absorption as claimed in any one of claims 1 through 19, wherein the near-infrared absorption layer contains a quencher compound.

21. A near-infrared absorption as claimed in claim 20, wherein the quencher compound is a metallic compound represented by the following formula (XII) or (XIII), or an aminium compound represented by the following formula (XIV):



in the formulae (XII) and (XIII), M is Ni, Cu, Co, Pt, or Pd;

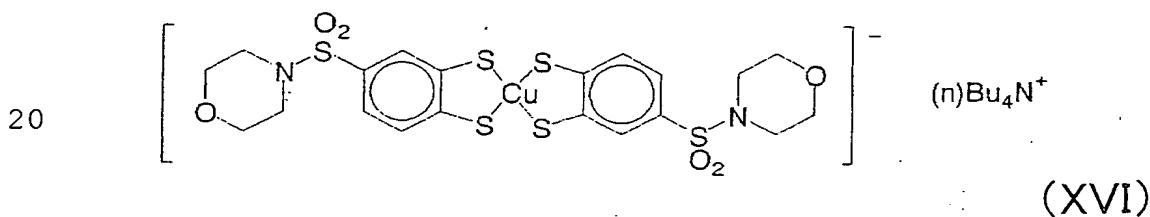
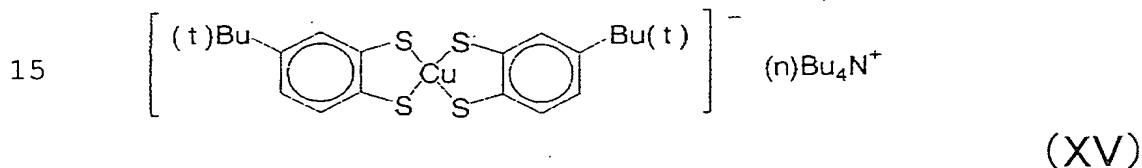




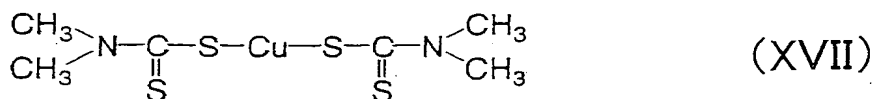
in the formula (XIV), each of R<sup>3</sup> through R<sup>6</sup> is at least one selected from a group consisting of an alkyl group, an aryl group, a group having aromatic ring, a hydrogen atom, and a halogen atom. G<sup>-</sup> is I<sup>-</sup>, Br<sup>-</sup>, ClO<sub>4</sub><sup>-</sup>, or BF<sub>4</sub><sup>-</sup>, PF<sub>6</sub><sup>-</sup>, SbF<sub>6</sub><sup>-</sup>, CH<sub>3</sub>SO<sub>4</sub><sup>-</sup>, NO<sub>3</sub><sup>-</sup>, or CH<sub>3</sub>-C<sub>6</sub>H<sub>4</sub>-SO<sub>3</sub><sup>-</sup>.

22. A near-infrared absorption film as claimed in claim 21, wherein the metallic compound represented by the formula (XII) is a 1,2-benzenethiol copper complex compound or a 1,2-benzenethiol nickel complex compound.

23. A near-infrared absorption film as claimed in claim 22, wherein 1,2-benzenethiol copper complex compound is represented by formula (XV) or (XVI):



24. A near-infrared absorption film as claimed in claim 21, wherein the metallic compound represented by the formula (XIII) is a complex represented by the following formula (XVII):



25. A near-infrared absorption film as claimed in any one of claims 20 through 24, wherein the near-infrared absorption layer contains 100 parts by weight or less of the quencher compound relative to 100 parts by weight of the diimmonium compound.

26. A near-infrared absorption film as claimed in any one of claims 1 through 25, wherein the near-infrared absorption layer contains a binder resin.

27. A near-infrared absorption film as claimed in claim 25, wherein the binder resin is polyester resin, acrylic resin, methacrylic resin, urethane resin, silicone resin, phenol resin, or a homopolymer or copolymer of (meth) acrylic acid ester.

28. A near-infrared absorption film as claimed in any one of claims 1 through 27, wherein the near-infrared absorption layer further contains a near-infrared absorbent (e.g. near-infrared absorbents of azo series, polymethine series, diphenylmethane series, triphenylmethane series, and quinine series), an antioxidant other than the quencher compound (e.g. antioxidants of phenol series, amine series, hindered bisphenol series, hindered amine series, sulfur seires, phosphoric acid series, phosphorous acid series, and metallic complex series), an UV absorbent, and a colorant, a pigment, and a dye for improving the appearance of the film.

29. A near-infrared absorption film as claimed in any one of claims 1 through 28, wherein the thickness of the near-infrared absorption layer is from 0.5  $\mu\text{m}$  to 50 $\mu\text{m}$ .

30. A near-infrared absorption film as claimed in any one of claims 1 through 29, wherein the base film is made of a synthetic resin.

31. A near-infrared absorption film as claimed in any one of claim 30, wherein the synthetic resin is polyolefine resin such as polyethylene and polypropylene, polyester resin, acrylic resins, cellulose resin, polyvinylchloride resin, polycarbonate resin, phenol resin, or urethane resin.

32. A near-infrared absorption film as claimed in any one of claims 1 through 31, wherein the base film has a thickness from 50  $\mu\text{m}$  to 200  $\mu\text{m}$ .